MAST90007: Statistics for Research Workers

This subject is an introduction to statistical methods, using Minitab statistical software. The subject will cover:

- Descriptive statistics; graphs, tables, summary statistics.
- Introduction to estimation and confidence intervals.
- The normal distribution; means and variances of sums of random variables; the Central Limit Theorem; the normal approximation to the binomial distribution.
- Confidence intervals for means and proportions.
- Introduction to hypothesis testing.
- Tests for differences in location between two populations with matched samples: sign test, Wilcoxon signed-rank test, \( t \)-test. The relationship between confidence intervals and hypothesis testing.
- Tests for differences in location between two populations with independent samples: \( t \)-test.
- Testing for difference in location of more than two populations. Analysis of variance (F-test), multiple comparisons.
- Two-way classifications: analysis of variance (F-test), interaction.
- Determination of sample size.
- Design of experiments: randomization, blocking, replication, confounding. Standard designs.
- Correlation and straight line regression.
- Multiple regression.
- Analysis of categorical data; contingency tables.

**Course dates:** Thursday 7 July to Tuesday 19 July 2016. The course is eight days with a weekend break and no classes on Wednesdays. There are four sessions each day; the first session of the day will commence at 9:00 a.m. and the final session will end at approximately 5:00 p.m. The sessions will mix lecture presentations with practical work using software; tutorial help will be available.

**Assessment:** Daily assessment is conducted during the final session of each day. The one and half hour exam will be held on Wednesday, 22 July 2016. The third component of the assessment is an assignment, a 1500-word assignment on the analysis and interpretation of quantitative data from an empirical research study.

**Venue:** The course will be held in the Wilson and Nanson Computer Laboratories in the Department of Mathematics and Statistics, Richard Berry Building, and a lecture theatre to be advised.

**Prerequisites:** There are no formal prerequisites though it is expected that most participants will have studied mathematics at VCE level, or equivalent. Participants need to be comfortable with a limited amount of mathematical notation. The onus is on participants to check that the subject suits their needs. Please do this carefully.

**Lecturers:** Associate Professor Ian Gordon, the Director of the Statistical Consulting Centre and Dr Sue Finch.
MAST90007  Statistics for Research Workers

Credit Points: 12.5
Co-ordinator: Professor Ian Gordon (telephone 47993)

Prerequisites: Students taking this subject must be currently enrolled in a Masters Degree by research, PhD, or MD. This course will involve mathematical, statistical and computing skills.

Contact: 8 days intensive: 48 hours (24 lectures, 24 hours of practice classes)

Objectives: Students taking this subject will:
- learn sound principles of design in research
- acquire skills in the analysis of research
- gain skills in the use of statistical software
- develop the ability to assess published research critically from a statistical point of view

Subject description: This subject is designed to provide students with training in statistical methods as applied to the design and analysis of projects undertaken by postgraduate students, across all disciplines. See subject outline for more details.

Assessment: - Up to 12 short exercises conducted during the course, including the use of software (continuous assessment), involving a total of no more than 15 written pages (30%);
- A 1.5 hour examination (50%).
- A 1500-word assignment on the analysis and interpretation of quantitative data from an empirical research study (20%) to be submitted two weeks after completion of the subject.

Important Dates for Statistics for Research Workers July 2016

Thursday 7 July  SRW classes commence
Tuesday 19 July  SRW classes end
Wednesday 22 July SRW examination
Friday 5 August  SRW assignment due